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Factors influencing the chloride removal of aqueous solution by calcined layered double hydroxides

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ABSTRACT

Chloride removal of aqueous solution by calcined layered double hydroxides (CLDH) was investigated in batch model. The influences of calcination temperature, Mg/Al molar ratio of CLDH, initial chloride concentration, and the presence of other anions on chloride removal from aqueous solution have been discussed in detail. It was found that the LDHs with an Mg/Al ratio of 4 calcined at 500°C had the highest removal capacity. The chloride removal capacity of CLDH decreasing with a rise in the temperature indicated that the process is exothermic in nature. And the data of sorption isotherms fitted well into the linearly transformed Langmuir equation. The negative values of ΔG^0 and ΔH^0 calculated using Langmuir constants, confirm the spontaneous and exothermic nature of chloride removal process. In addition, regeneration of the spent CLDH adsorbent was also studied in order to assess the potential for recycling the material. The explanations of chloride removal and regeneration phenomena have been supported by X-ray diffraction (XRD) and thermo-gravimetric/differential thermal analyzer (TG-DTA).

Keywords: Layered double hydroxides; Calcined; Chloride removal; Sorption isotherms

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